DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 12/03/2008 has been entered.

Response to Arguments

2. Applicant's arguments filed 12/03/2008 have been fully considered but they are not persuasive. Please see the discussion below.

3. In response to applicant's argument on pages 8-12 of the *Remarks* that the Examiner has not established a *Prima Facie* for obviousness. As per the discussion below Biemond has taught a computationally intensive iterative image deblurring method, Owens has taught the implementation of image processing methods on array processors (decreases computational time), Ray has taught the implementation of e taught the system the implementation of iterative image processing methods on an array processor. The combination of Biemond in view of Owens is motivated by not only the need to decrease the time of computation, but also the teachings of Ray that clearly have taught the implementation of iterative image deblurring methods on an array processing system (provides reasonable expectation of success). Furthermore, given that a video is merely a sequence of still images, and that Biemond, Owens,

and Ray have taught that the processing of blurred still images it would have been obvious to one of ordinary skill in the art at the time of the invention to input a series of related blurred images (video) into the system to deblur a series of image data (video) with a reasonable expectation for success in deblurring the series of images using a system designed to deblur images. Furthermore, there exists a need for correcting blurred images that are taken as still images and as a video sequence (sequence of still images). Okuda has taught the use of parallel processing to process image data in real-time (real-time means no delay). Thus, given the teachings of Okuda one of ordinary skill in the art at the time of the invention would have combined the teachings of teachings of Biemond, Owens, and Ray with Okuda by adapting the parallel processing system taught by Biemond, Owens, and Ray to process the image data in real-time as taught by Okuda to correct a blurred series of images (video) at a high rate. Also, applicant's own cited art has taught the real-time image processing capabilities of Array Processors (Swaiij et. al., and Kung et. al.).

4. In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). Please see the above discussion regarding this matter.

5. In response to applicant's argument on page 12 that Okuda teaches color correction and not image deblurring. The Examiner is not relying on the teachings of Okuda to teach the specifics of the image processing method (Biemond is relied on for this), but the teachings of Okuda are relied upon for only the teaching that the correction of a series of video images on a parallel processing system is real time processing.

6. In response to applicants' arguments on page 13 (2nd paragraph) that the prior art references do not teach the new limitation. Please see the discussion of these new limitations in the 35 USC 103 rejections presented below.

7. In response to applicants' arguments on page 16 (paragraph 3) that the listed equation has not been disclosed, the Examiner has shown the listed equation minus the regularization term was taught by Biemond (Examiner relied on Biemond to describe the *Van Cittert* method*)*, and that the regularization term has been taught by Gorinevsky.

8. In response to applicants' arguments on page 17 that the prior art references have not taught the preloading of data into the array processing block, the Examiner has established that the preloading of the necessary coefficients into the matrix is an inherent part of performing array processing. If this process is not performed, then no manipulation of the data would be performed by the described prior art references. However, since the references clearly teach the manipulation of data, then it is clear that the step of loading the desired coefficients has been

performed. Therefore, the combination of the presented teachings has inherently included the loading of filtering coefficients into the processing elements.

Claim Rejections - 35 USC § 101

9. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 21-26 are rejected under 35 U.S.C. 101 as not falling within one of the four statutory categories of invention. Supreme Court precedent[1] and recent Federal Circuit decisions[2] indicate that a statutory "process" under 35 U.S.C. 101 must (1) be tied to another statutory category (such as a particular apparatus), or (2) transform underlying subject matter (such as an article or material) to a different state or thing. While the instant claim(s) recite a series of steps or acts to be performed, the claim(s) neither transform underlying subject matter nor positively tie to another statutory category that accomplishes the claimed method steps, and therefore do not qualify as a statutory process. For example claim 21 requires the deblurring of an image using an iterative method but does not require a particular machine (can be a mental process), nor does it describe a physical transformation.

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[1] *Diamond v. Diehr*, 450 U.S. 175, 184 (1981); *Parker v. Flook*, 437 U.S. 584, 588 n.9 (1978); *Gottschalk v. Benson*, 409 U.S. 63, 70 (1972); *Cochrane v. Deener*, 94 U.S. 780, 787-88 (1876).

[2] *In re Bilski*, 88 USPQ2d 1385 (Fed. Cir. 2008).

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

11. Claims 7-8, 12-15, and 19-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Biemond in further view of Owens ("Computer Vision on the MGAP") and Ray et. al. ("Recursive Least Square Technique and Parallel Implementation Approach and Image Restoration"), and in further view of Quatieri et. al. (“Extensions of 2-D Iterative Digital Filters”).

Instant claim 7: A device for deblurring an video image, comprising:

a systolic array processor adapted to download a blurred video image,

said systolic array processor comprising an array of processing logic blocks in parallel adapted such that groups of a plurality of pixels arrive in each respective processing logic block of said array of processing logic blocks respectively, [*Biemond has disclosed an iterative method (section “C. Iterative Solutions" beginning on page 865) for image deblurring performed by a computing system used to process the image, but does not explicitly teach the downloading of a video image or the use of a systolic array processor to perform the deblurring method. Owens has taught the downloading of an image for further processing in paragraph 2 of the "Introduction" section, and further teaches the use of a systolic array of interconnected logic*

blocks (Digit Processors) for the parallel processing of images (deblurring is image processing) in sections 2.1 and 3.1. Furthermore, figure 4 of Owens shows the adjacent interconnections of the processing array in which the plurality of pixels are communicated to their respective Digit Processors (processing logic blocks). In view of the teachings of Owens (use of array processors for image processing) it would have been obvious to one of ordinary skill in the art at the time of the invention to use the known systolic array disclosed by Owens with the known iterative image deblurring method disclosed by Biemond to reduce the computational time of the iterative image processing method of Biemond. Furthermore, according to the teachings of Ray (abstract), the implementation of iterative methods on a systolic array was known to one of ordinary skill in the art at the time of the invention. Thus, the combination provides the predictable result of iterative image deblurring according to the known method of Biemond using the known device of a systolic array as disclosed by Owens and Ray. Owens has also taught that the various image algorithms of low, medium, and high level of complexity are performed on the order of microseconds (see sections 3.1 to 3.3). Also, neither Owens, nor Ray, nor Biemond have discussed the processing of video images. However, Examiner takes official notice that it was notoriously well known to one of the ordinary skill in the art to process streaming video frames using a still image processing system that processes individual frames at a sufficiently fast rate, and such a rate is achieved through the use of systolic arrays (evidenced by Owens). Therefore, one of ordinary skill in the art at the time of the invention would have modified the system of operating on still images as taught by Biemond in view of Owens and Ray with the knowledge of one of ordinary skill in the art to perform the predictable result of processing a series of images

in a frame by frame manner. Thus the method taught by Biemond in view of Owens and Ray for deblurring an image is also applicable to the processing of a sequence of images (video).];

wherein said processor is adapted to process a feedback of a blurred image predication error based on a first localized FIR convolution operator and a feedback of a past deblurred image estimate based on a second localized FIR convolution operator [*As per the discussion of claim 8 (see discussion below), Biemond has taught the feedback of a prediction error and a past deblurred image estimate on. Furthermore, the listed equation (equation 57 on page 865) lists B and unity gain on the predicted error and the past deblurred image estimate, but Biemond is silent on whether the system was implemented as an FIR or IIR filter. However, the filtering system is inherently either an FIR or equivalent IIR filter. As per the teachings of Quatieri in the introduction section, it was well known to design iterative filters such as the method taught by Biemond, as FIR (finite impulse response) filter. Therefore, given the teachings of Quatieri it would have been obvious to one of ordinary skill in the art to implement the iterative method of Biemond in view of Owens and Ray using one of two interchangeable design choices (FIR) with a reasonable expectation of success. Additionally, the selection of an FIR or IIR process of filtering is a necessary and inherent step before implementation of the method as a filter in any system (serial, parallel, array,..) can be performed. Also, see the discussion of related claim 21.*]

by sequentially exchanging data between said array of processing logic blocks by interconnecting each processing logic block with only a predefined number of the processing logic blocks adjacent thereto and [*This is the definition of array processing, which is the processing and communication of data by a grid of processing units that are interconnected with adjacent processing units. For an example see figure 4 of Owens or the figures of Ray.*]

wherein said systolic array processor is adapted to provide an iterative update of said blurred video image by storing each pixel of said plurality of pixels in three planes within said systolic array processor wherein said iterative update occurs within said blurred video image video frame update rate, and [*Biemond has taught the iterative deblurring method in the section entitled "Iterative Solutions" beginning on page 865 using three sets of data (f_{k+1}, f_k, and g-Hf_g) each dependent on the particular pixel data they correspond to (thus each set is an image "plane" because it varies with x and y, where x and y are the pixel indices). The method and system disclosed by Biemond in view of Owens and Ray correct the image at some rate but do not specify that it is at the frame rate of the video ("real-time"). However, Owens has taught in section 3 that the still image processing occurs in the order of micro-seconds per image. Furthermore, the use of processing arrays for real-time processing has been well established in the art due to their efficiency of handling significant amounts of data at high rates of speeds (high scalability). Additionally, the real-time processing capability of array processing systems has been evidenced by several of the applicants' cited references such as Kung et. al. and Swaiij et. al., as well as the teachings of Owens that specifies the rate at which even complex image processing algorithms occur in micro-seconds. In view of the above teachings, one of ordinary skill in the art at the time of the invention would have expected the reduction in image processing time when utilizing an array processing system on such an order to allow for (frame update rate is real-time) real-time processing of data. In addition, real-time still image processing allows for real-time video processing since a video is a sequence of single images. (Also, see discussion of this claim in the above "Response to Arguments" section.)*]

wherein said systolic array processor is further adapted to upload a deblurred video image [*Owens and Biemond do not explicitly teach the uploading of the blurred image. However, Examiner takes official notice that the uploading of the deblurred (processed) image is notoriously well known in the art. Since the purpose of deblurring the image is to produce a deblurred image for display or further processing, and thus would have been obvious to one of ordinary skill in the art to modify the teachings of Owens, Biemond, and Ray to store or upload the processed image for retrieval or display*].

Instant claim 8: The device of claim 7, wherein said three planes comprises said blurred video image, a blurred video image prediction error, and a past deblurred video image, wherein said array of processing logic blocks provide an iterative update of said blurred video image by (i) providing feedback of said blurred image prediction error using said deblurred video image and (ii) providing feedback of said past deblurred image estimate. [*Owens and Ray have disclosed the implementation of an iterative method on a systolic array as is discussed in rejection of instant claim 1. Biemond teaches an iterative method for deblurring images in pages 865-868 under the section titled "C. Iterative Solutions" using error feedback and past deblurred image estimate feedback (f_{k+1} is the blurred image, f_k is the past iteration of the deblurred image, and $g-Hf_k$ is the prediction error). In particular, see equations 56 and 57 on page 865. The explicit description of the loading of the filtering coefficients is not disclosed by the cited references. Furthermore, the teachings of Owens and Ray have evidenced that the use of array processors for image filtering was known to one of ordinary skill in the art at the time of the invention. See*

the above discussion in the response to applicants' remarks that the preloading of filter coefficients is an inherent part of the processing.]

Instant claim 12: The device of claim 7, wherein said each group of said groups of said plurality of pixels processor groups pixel in groups that comprises at least one pixel. [*Biemond in view of Owens and Ray as applied to claim 1 have taught the deblurring of an image using a systolic processor array. Owens teaches the implementation of image processing methods using systolic array processors for image processing and in the final line of the 2nd paragraph on page 338 that at a least one pixel is operated on per processor. Thus, as is taught by Owens the pixels are grouped into groups of pixels such that at least one pixel is operated on per processor.*]

Instant claim 13: The device of claim 12, wherein said groups of pixels comprises a group selected from 2 by 2 pixels, 3 by 3 pixels, and 4 by 4 pixels. [*Filtering and image processing methods such as deblurring are done locally by operating on groups of adjacent pixels. Owens discloses an example of such a grouping in section 3.1 on page 338 wherein Owens disclosed the use of 3x3 masks applied to the image and hence it was known to group and process pixels in a processing array.*]

Instant claims 14-15 and 19-20: As per the discussion of claims 7-8 and 12-13, the limitations of claims 14-15 and 19-20 have been disclosed by the prior art.

12. Claims 9-10 and 16-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Biemond in view of Owens, Ray, and Quatieri as applied to claims 1-2 and 5 above, and in further view of Gorinevsky ("Optimization-based Tuning of Low-bandwidth Control in Spatially Distributed Systems").

Instant claim 9: The device of claim 8, wherein said systolic array processor includes an iterative update is implemented in said each processing logic block by $u(n+1) \equiv u(n) - K * (H * u(n) - y_b) - S * u(n)$ [*Biemond: see equations 56 and 57 on page 865, u(n+1)=f(k+1), u(n)=f(k), g=* y_b *, K=B, and H=H*] where u comprises an ideal undistorted image, m and n comprise column and row indices of an image pixel element, $y_b(m,n)$ comprises an observed blurred image, * denotes a 2-D convolution, K comprises a feedback update operator with a convolution kernel k(m,n) and S comprises a smoothing operator with a convolution kernel s(m,n) [*Biemond identifies the existence of regularization error and discloses a solution of the regularization error in section 5 which begins on page 868. The term* $S * u(n)$ *as defined by applicant was known to one of ordinary skill in the art as a solution to the regularization problem. Biemond does not teach the regularization method shown by applicant. However, Gorinevsky in sections 1 and 3 teaches a filter that improves the spatial response (reduces regularization error) of the system. It would have been obvious to one of ordinary skill in the art to substitute the regularization method as taught by Gorinevsky for the regularization method taught by Biemond with a reasonable expectation of success while maintaining or improving the spatial response (reduction of regularization error) provided by the method taught*

by Biemond. Furthermore, in the same sections of Gorinevsky the use of the term K has also been disclosed.].

Instant claim 16: As per the discussion of claim 9, the limitations of instant claim 16 have been disclosed by the prior art.

Instant claims 10 and 17: The device of claim 9 [*and 16*], wherein the operators H, K, and S are preloaded in each of the array processing logic blocks. [*Owens and Ray do not explicitly teach the preloading of the information into each processing logic block of the array. However, as is evidenced by Owens in the 2nd paragraph of page 338 the addition, subtraction, multiplication, ... etc. are preformed on the received pixel data. In order to perform these operations the values intended to be used in these operations must be stored in the processing elements. Furthermore, see the discussion of this limitation provided in the response to applicants' remarks. Thus it is clear from this disclosure that known constants are stored in the processing units (logic blocks) in order to perform the predetermined operations*]

13. Claims 11 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Biemond in view of Owens, Ray, Gorinevsky, and Quatieri as applied to claims 3, 9-10, and 16-17 in further view of Dowski (US 2003/0169944).

The device of instant claim 11 is a modification of the method of instant claim 10 wherein the deblurring is performed on each color space separately. Biemond discusses image processing,

but does not go into the particulars of color space processing. However, as is evidenced by Dowski in paragraph 0018 the method of dividing an image into its color spaces and then deblurring each of the color spaces was known to one of ordinary skill in the art. The teaching of Dowski shows that one of ordinary skill in the art knew how to apply image-filtering processes such as deblurring to a color image by breaking it down into color channels and processing each one separately. Given that Biemond teaches the deblurring of at least a grayscale image and that Dowski teaches the application of a deblurring process to each of the color channels individually (i.e. treat each channel independently). Then it would have been obvious to one of ordinary skill in the art to combine the teachings of Dowski with Biemond to perform the deblurring technique as taught by Biemond on each channel of a color image and yield the expected result of a deblurred color image.

Instant claim 18: As per the discussion of claim 11, the limitations of instant claim 18 have been disclosed by the prior art.

14. Claims 21-22, 24, and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Biemond in further view of Quatieri et. al. ("Extensions of 2-D Iterative Digital Filters").

Instant claim 21: An image deblurring method comprising;

processing a blurred image by performing an iterative update of a deblurred image estimate utilizing a first term comprising a feedback of a blurred image predication error and a second term comprising a feedback of a past deblurred image estimate based on a second

localized FIR convolution operator added to a discrete integrator. [*As per the discussion of claim 8 (see discussion below), Biemond has taught the feedback of a prediction error and a past deblurred image estimate on. Furthermore, the listed equation (equation 57 on page 865) lists B and unity as the terms convolved with the predicted error and the past deblurred image estimate, but Biemond is silent on whether the system was implemented as an FIR or IIR filter. However, the filtering system is inherently either an FIR or equivalent IIR filter. As per the teachings of Quatieri in the introduction section, it was well known to design iterative filters such as the method taught by Biemond, as FIR (finite impulse response) filter. Therefore, given the teachings of Quatieri it would have been obvious to one of ordinary skill in the art to implement the iterative method of Biemond in view of Owens and Ray using one of two interchangeable design choices (FIR) with a reasonable expectation of success in implementing a known filtering method using a known design method. Additionally, the selection of an FIR or IIR process of filtering is a necessary and inherent step before implementation of the method as a filter in any system (serial, parallel, array,..) can be performed. Also, it is an inherent part of FIR implementation that a past value feedback as taught by Biemond is implemented using a discrete integrator, which is an ideal time delay (if no time delay then the feedback would be of the current deblurred image).*]

Instant claim 22: The method of claim 21 wherein said first term is based on a first localized FIR convolution operator and said second term is based on a second localized FIR convolution operator. [*Convolution is an inherent part of image filtering, as per above the equation has been defined by Biemond, and the terms of convolution can be derived from the provided equation.*]

Instant claim 24: The method of claim 21 wherein said blurred image is a video image. [*A video image is a still image, as per the discussion of the above claims the deblurring of an image has been taught.*]

Instant claim 26: The method of claim 25 wherein said first term is based on a first localized FIR convolution operator and said second term is based on a second localized FIR convolution operator. [*See the discussion of claims 21-22.*]

15. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Biemond and Quatieri as applied to claims 21-22 above, and in further view of Gorinevsky ("Optimization-based Tuning of Low-bandwidth Control in Spatially Distributed Systems").

Instant claim 23: The method of claim 22 wherein said iterative update is implemented in a systolic array processor such that each processing logic block of said systolic array processor by u(n + 1) = u(n) -- K *(H *u(n) -- yb)--S* u(n) [*Biemond: see equations 56 and 57 on page 865, u(n+1)=f(k+1), u(n)=f(k), g=* y_b, *K=B, and H=H*] where u comprises an ideal undistorted image, m and n comprise column and row indices of an image pixel element, yb (m,n) comprises an observed blurred video image, * denotes convolution, K comprises a feedback update operator with a convolution kernel k(m,n) and S comprises a smoothing operator with a convolution kernel s(m.n). [*Biemond identifies the existence of regularization error and discloses a solution of the regularization error in section 5 which begins on page 868. The term*

$S * u(n)$ *as defined by applicant was known to one of ordinary skill in the art as a solution to the regularization problem. Biemond does not teach the regularization method shown by applicant. However, Gorinevsky in sections 1 and 3 teaches a filter that improves the spatial response (reduces regularization error) of the system. It would have been obvious to one of ordinary skill in the art to substitute the regularization method as taught by Gorinevsky for the regularization method taught by Biemond with a reasonable expectation of success while maintaining or improving the spatial response (reduction of regularization error) provided by the method taught by Biemond. Furthermore, in the same sections of Gorinevsky the use of the term K has also been disclosed.*]

16. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Biemond and Quatieri as applied to claims 21-22 above, and in further view of Owens and Ray as applied to claim 7.

Instant claim 25: The method of claim 24 wherein said iterative update occurs within said blurred image video frame update rate. [*Biemond (defines equations and filtering techniques but not implementation as a filter) in view of Quatieri (taught FIR filter design of iterative methods) has taught the implementation of an iterative method as a usable filter, but has not taught the rate at which the still images are processed. Biemond has disclosed an iterative method (section "C. Iterative Solutions" beginning on page 865) for image deblurring performed by a computing system used to process the image, but does not teach that the speed of the system is sufficient to perform real-time image processing (video frame rate 1/30th of a second is 0.0333334 seconds*

which is more than 33 microseconds) the use of a systolic array processor to perform the deblurring method. Owens has taught the use of a systolic array of interconnected logic blocks (Digit Processors) for the parallel processing of images (deblurring is image processing) in sections 2.1 and 3.1. Furthermore, figure 4 of Owens shows the adjacent interconnections of the processing array in which the plurality of pixels are communicated to their respective Digit Processors (processing logic blocks). In view of the teachings of Owens (use of array processors for image processing) it would have been obvious to one of ordinary skill in the art at the time of the invention to use the known systolic array processing system disclosed by Owens with the known iterative image deblurring method disclosed by Biemond in view of Quatieri to reduce the computational time of the iterative image processing method of Biemond. Furthermore, according to the teachings of Ray (abstract), the implementation of iterative methods on a systolic array was known to one of ordinary skill in the art at the time of the invention. Thus, the combination provides the predictable result of iterative image deblurring according to the known method of Biemond in view of Quatieri using the known device of a systolic array as disclosed by Owens and Ray. Owens has also taught that the various image algorithms of low, medium, and high level of complexity are performed on the order of microseconds (see sections 3.1 to 3.3). Also, neither Owens, nor Ray, nor Biemond have discussed the processing of video images. However, Examiner takes official notice that it was notoriously well known to one of the ordinary skill in the art to process streaming video frames using a still image processing system that processes individual frames at a sufficiently fast rate, and such a rate is achieved through the use of systolic arrays (evidenced by Owens). Therefore, one of ordinary skill in the art at the time of the invention would have modified the system of operating on still images as taught by

Biemond and Quatieri in view of Owens and Ray with the knowledge of one of ordinary skill in the art to perform the predictable result of processing a series of images in a frame by frame manner. Thus the method taught by Biemond in view of Owens and Ray for deblurring an image is also applicable to the processing of a sequence of images (video). Additional prior art not cited in the above discussion, such as Kung and Swaiij (cited by applicant) teaches that the systolic processing arrays are used for real-time image processing.]

Conclusion

17. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Contact Information

18. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nathan Bloom whose telephone number is 571-272-9321. The examiner can normally be reached on Monday through Friday from 8:30 am to 5:00 pm (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Bella, can be reached on 571-272-7778. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Matthew C Bella/

Supervisory Patent Examiner, Art Unit 2624